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DETAILED DESCRIPTION

[Detailed Description of the Invention]
Field of the invention on the secondary intermodulation compensation industry in a homodyne receiver This invention relates to the equipment with which a detail is compensated for the undesired signal by the secondary intermodulation term further with respect to a homodyne radio set.
Generally the homodyne reception machine is known as what the superheterodyne receiver deformed. Generally a superheterodyne receiver receives the signal of the first frequency band, mixes the received signal with the oscillator signal generated locally, and changes them into the second or an intermediate frequency band. The selected signal to search for always appears in the same frequency section in an intermediate frequency band by separating only a fixed value from the signal with which it was chosen in the first frequency band and to search for, and choosing a local-oscillator signal. The intermediate frequency filter by which fixed alignment was carried out can perform now easily selection of a signal which was chosen by this and for which it asks.
In the homodyne reception machine which transformed the superheterodyne receiver, the selected intermediate frequency band is a direct current or zero frequency. Therefore, the local oscillator is carrying out zero frequency separation from the selected signal to search for. All the modulations to the selected signal which generates a spectrum component in the vertical both directions of nominal signal frequency and to search for are collapsed as a component under dF or on dF of signal frequency from signal frequency in the mixer output section, and this should appear as an intermediate frequency on dF of nominal zero. Thus, in order to raise the resolution of the collapsed component, two mixers possess in the homodyne reception machine which uses the signal with 90 phase offset of local-oscillator plurality. Therefore, as I=A+B, in another mixer output section, the component of the upper and lower sides of nominal signal frequency is collapsed as Q=j (A-B), appears, and is separated here if needed as B=(I+jQ)/2, or A= (I-jQ) / 2 by the one mixer output section.
Actuation of such a homodyne reception machine is further indicated by the detail at U.S. Pat. No. 5,241,702, and this is referred by this specification by raising here.
One problem of actuation with a known homodyne reception machine is equal to the received frequency which local oscillator frequency wishes, and is receiving the interferent component to which the homodyne reception machine's originates in radiation from the local oscillator of itself as a result. When local oscillator frequency is completely in agreement with a nominal expectation frequency, this interferent component is completely changed into zero frequency or DC in the mixer output section, big DC offset component is generated, and this is the reinforcement of the degree of bigger many than the signal to search for. However, this interferent component differentiates and digitizes the complex basic band signal output from a right-angle mixer, and it can remove by applying a technique including re-finding the integral numerically.
Although this should include as a result the signal with which, as for the problem about the known homodyne reception machine which lets an antenna bandwidth filter pass, many do not wish total power, and the signal searched for similarly, this is becoming the unjust term which is usually rectified by the square distortion term in RF amplifier or a right-angle down converter, and is added to a complex

basic band signal. The unjust term of this form is produced most strongly at the time of a burst mold like TDMA transmission, or amplitude modulation of the interference signal would not be carried out.
When other powerful interference signals exist in the input of a right-angle down converter on the frequency of arbitration, such a signal can be changed into DC by mixing a signal in person through all the even number degree distortion terms in the polynomial representation of a mixer transfer function. Although this effectiveness can be minimized by choosing the balanced type mixer structure and push pull RF amplifier structure which offset even number degree distortion, the maximal term of such even number degree distortion is known as a square term and a secondary intermodulation, or IP2. Nevertheless, it originates in the residual IP 2 produced since the balance within balanced type structure is imperfect, and the signal of sufficient reinforcement can generate immobilization or adjustable DC offset.
This invention aims at the homodyne radio set equipment for mitigating all immobilization or adjustable DC offset which were generated by residual IP2 term in known homodyne reception machine actuation.
Epitome of invention The purpose of these and others is realized by the homodyne wireless receiving set containing an antenna, an antenna band-pass filter, RF amplifier, and the right-angle down converter to a complex basic band based on this invention. The local oscillator for down converters has a core together put by the received frequency to wish, and he is trying to gather for the surroundings whose complex basic band signal is zero frequency in the example shown as an example of this invention.
This equipment is performed about this by preparing all the additional power detectors for measuring the total received power which passes along said antenna band-pass filter compensation of such an unnecessary term caused by the secondary intermodulation (IP2). Instantaneous power measured value is supplied to a signal-processing unit with said complex basic band signal, and when a complex compensation multiplier takes correlation with a power signal and a complex band signal here, it is determined. Next, the amount with weight of said power signal is subtracted from said complex basic band signal using this multiplier, and unnecessary IP2 distortion term is offset. Thereby, this invention offsets the effectiveness of the IP2 interference in a homodyne wireless receiving set.
Easy explanation of a drawing It is here which is not what is given only in order that these attached drawings may illustrate, although this invention will be understood still more completely from the following detailed explanation and an attached drawing, and restricts this invention. Drawing 1 illustrates the block diagram of the equipment for offsetting the secondary intermodulation based on one example of this invention.
Drawing 2 illustrates the block diagram of the equipment based on the 2nd example of this invention.
and -- Drawing 3 illustrates the block diagram of the equipment based on the 3rd example of this invention.
Detailed explanation of an example The example of this invention aims at the approach in the equipment list for offsetting unnecessary IP2 distortion term in a homodyne wireless receiving set. One example of this invention about the equipment which offsets the effectiveness of IP2 interference is shown in drawing 1 in the general format.
In the example illustrated by drawing 1 , a signal is received with the bandwidth which was inputted into equipment and defined with the antenna band-pass filter (2) by the antenna (1). In one example of this invention, a part of composite signal which had the antenna band-pass filter (2) passed is led to a power detector (6) by the directional coupler (3), and, on the other hand, most composite signals are r. f. An amplifier (4) and a right-angle down converter (5) are supplied. A part of composite signal which passed along the antenna band-pass filter (2) may be led for example, to a power detector (6) by the signal ejection unit again. This of P is like [all power measured-value signal wave form P (t) is generated using the square equipment to a power detector (6), and] the Gilbert (Gilbert) multiplier cel suitable for being accumulated into for example, a silicon integrated circuit. In another example, a linearity detector is used as a power detector (6), and generates all power measured-value signal wave form P (t). The amount with weight of power measured-value signal wave form P (t) is formed according to the weight "a" and "b" which were inputted using the weighting unit (7 8), respectively. A weighting factor (a, b) is once determined as a thing relevant to the IP2 property of an r.f. amplifier (4)

and a right-angle down converter (5), and is fixed to all. On the other hand, this IP2 property may change with processing and its operating temperature from a weighting unit. Consequently, a weighting factor (a, b) is suitably determined by the signal-processing unit (13) accommodative.
The amount aP with weight (t) of power measured-value signal wave form P (t) and bP (t) subtract from the output of a right-angle down converter (5) using the first and second subtraction machine (9 10), and generate IP2 compensatory signal. Since the sign of a weighting factor (a, b) is appropriately chosen apart from this, if it is, it will be the first and second subtraction machine (9 10).
Realizing as an adder is also possible.
In this example, the signal compensated IP2 from the first and second subtraction machine (9 10) continues, and the pass band width of the signal which low-pass filter processing is carried out and is searched for within the first and the second low-pass filter (11 12) is determined. The compensated signal which passed along the filter is processed in a signal-processing unit (13) next, and the output signal (14) which was restored to which / decoded and to search for is generated.
A signal-processing unit (13) can be functioned based on U.S. Pat. No. 5,241,702 which is referred to also here and which was described previously, and also can include DC offset compensation, digitization, and digital signal processing. It is possible to incorporate the new function based on [in addition to a function given in United States patent 5,241,702nd described previously] one example of this invention in a signal-processing unit (13) to adjust a weighting factor (a, b) accommodative. This new function takes the output signal and correlation which were compensated for power measured-value signal wave form P (t) from the first and the second low-pass filter (11 12), and determines compensation precision. Correlation is lost between the signals and power signals which were compensated when exact compensation was performed. When there is no compensation at zero, an error is in a weighting factor (a, b), and magnitude with error is shown. Then, a signal-processing unit (13) generates the adjusted weighting factor (a, b), and this is fed back to a weighting unit (7 8), and performs compensation after adjustment.
In order to perform the new function about digital signal processing, the third low-pass filter (15) similar to the first and the second low-pass filter (11 12) is used, low-pass filter processing is carried out, and the analog / digital conversion of the power measured-value signal wave form P (t) are continuously carried out in the signal-processing unit 13. For example, this analog / digital conversion are performed using a high bit rate delta sigma modulation. Then, correlation multiplies by the signal digitized from the first after internal reconstruction was carried out and the second low-pass filter (11 12) based on U.S. Pat. No. 5,241,702 which described it as the digitized power signal previously, and is performed. Next, the time average of the value by which it multiplied is carried out, and the judgment of whether finally correlation exists between a power signal and the compensated signal is performed. Then, it is used in order that control of an output signal (14) may optimize a signal-processing unit (13), and this takes power signal P (t) and correlation for the compensated signal aP (t) and bP (t), and it is carried out by determining a residual non-offset each other distortion component. They are all power signals.
When P (t) is generated by the linearity (magnification) detector, the linearity value receives polynomial conversion of the degree of the arbitration which squared by numerical processing within the signal-processing unit (13), of course, and generated the power related value, or suited IP2 or optimizing compensation of a high order term more instead of it.
Moreover, a signal-processing unit (13) also compensates DC offset which exists in the output of a down converter (5). It digitizes, and a signal-processing unit (13) continues, and the compensated signal aP (t) and bP (t) are differentiated, and it compensates [it performs the numerical re-integral of the signal differentiated and digitized and] DC offset. A signal-processing unit (13) performs DC blocking and digitization of the signal aP (t) compensated further and bP (t), and compensates DC offset. By presuming the error in the component for which the compensated signal aP (t) which was produced by DC blocking and bP (t) ask, a signal-processing unit (13) subtracts these presumed errors, and compensates DC offset.
In the example illustrated by drawing 1 , it is possible to connect some components to sequence different from this, without affecting radical Motohara ** of equipment. For example, it is possible to hang a

filter on down converter signal and power signal P (t) before subtraction. As illustrated by drawing 2 , the first and the second low-pass filter (11 12) are connectable between the right-angle down converter (5), first, and second subtraction machines (9 10). It is illustrating that drawing 2 can use and sample sampling equipment (33) after a power detector (6) is amplified with r.f. amplifier (4) in all power signals again.
The second alternative example of this equipment is illustrated by drawing 3 . The signal which was received using the antenna (1) and band-limited with the antenna band-pass filter (2) when drawing 3 was referred to
It is amplified with ** r.f. amplifier (4). The amplified signal is supplied to both a right-angle down converter (5) and a power detector (6). The down convert signal (I, Q) from a right-angle down converter (5) is supplied to a signal-processing unit (20) with the power signal P. This signal-processing unit (20) compensates unnecessary IP2 distortion component combining the power signal P and a down convert signal (I, Q). A signal-processing unit (20) can be numerically subtracted from I which performed filtering, an analog / digital conversion, and a digital-signal-processing function, and generated the power signal with weight internally to the digital-signal-processing unit (20), for example, was digitized, and a Q signal.
A signal-processing unit (20) can change a down convert signal (I, Q) and the power signal P into a corresponding sample train including an analog / digital conversion function. A signal-processing unit (20) can generate the output signal 14 which subtracted the power signal P by which weighting was carried out from the down convert signal (I, Q) using I weighting factor and Q weighting factor, and was compensated. Then, a signal-processing unit (20)
** -- phase murder and offset of an unnecessary signal are optimized for the secondary distortion term which adjusts I- and Q-weighting factor continuously and exists in a down convert signal (I, Q). A signal-processing unit (20) optimizes control of an output signal (14) by carrying out in this way and determining residue of the distortion component offset by taking correlation with a down convert signal (I, Q) and the power signal P.
It is considered that such all deformation is what falls to the range list of this invention indicated by the attached claim into pneuma.

[Translation done.]